

GP 2811



Docket No. IRV1.PAU.53

Pat nt Application

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Angel Antonio Pepe, et al.

Serial No.: 09/938,686

Filed: October 30, 2001

For: STACKABLE LAYERS
CONTAINING ENCAPSULATED
INTEGRATED CIRCUIT CHIPS
WITH ONE OR MORE
OVERLYING INTERCONNECT
LAYERS AND A METHOD OF
MAKING THE SAME

Examiner: Nguyen, Cuong Quang

Group Art Unit: 2811

Irvine, California

September 25, 2002

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RESPONSE TO RESTRICTION REQUIREMENT

Assistant Commissioner for Patents
Washington, DC 20231

Dear Sir:

In response to the Office Action mailed August 27, 2002, applicant hereby elects to prosecute Group II, containing Claims 1-16.

Please feel free to contact the undersigned if you have any questions or comments.


Certificate of Mailing

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Box Fee Amendment, Assistant Commissioner for Patents, Washington, DC 20231 on September 25, 2002.

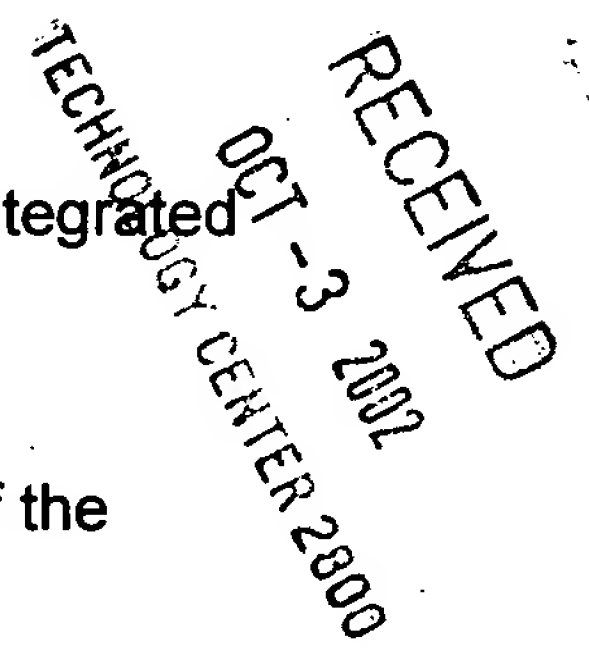
By Angela Williams

Signature
September 25, 2002

Respectfully submitted,


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Appendix of Amended Claims With Amendments Shown



1 1. A method of preparing a pre-formed integrated circuit chip for
2 encapsulation in an electronic package, comprising the steps of:
3 forming an interconnect assembly separately from said pre-formed integrated
4 circuit chip;
5 forming a plurality of conductive bumps connected to the terminals of the
6 integrated circuit chip;
7 bonding said interconnect assembly to said prepared integrated circuit chip; and
8 passivating said bonded interconnect assembly and said prepared integrated
9 circuit chip into an integral structure to provide said electronic package.

1 2. The method of claim 1 wherein said step of forming an interconnect
2 assembly comprises forming said interconnect assembly on a releasable substrate.

1 3. The method of claim 1 wherein said step of forming an interconnect
2 assembly comprises forming at least one test pad in an interconnect layer, which at
3 least one test pad can be accessed and electrically connected on opposing sides of
4 said test pad.

1 4. The method of claim 3 wherein said step of forming at least one test pad
2 forms a test pad having gold on opposing sides of said test pad and sandwiched
3 therebetween a conductive field metal.

4 5. The method of claim 3 wherein said step of forming an interconnect
5 assembly comprises forming at least one test pad in a plurality of stacked interconnect
6 layers, each of which at least one test pad in each interconnect layer can be accessed
7 and electrically connected on opposing sides of said test pad.

1 6. The method of claim 5 wherein said step of forming at least one test pad
2 in a plurality of stacked interconnect layers forms at least one test pad in each layer
3 having gold on opposing sides of said test pad and sandwiched therebetween a
4 conductive field metal.

1 7. The method of claim 1 where said step of forming a plurality of conductive
2 bumps connected to the terminals of the integrated circuit chip form a metallic bump
3 making connection to a terminal on said integrated circuit chip and a solder layer
4 disposed on said metallic bump.

1 8. The method of claim 7 wherein said step of forming an interconnect
2 assembly comprises forming at least one test pad in an interconnect layer, which at
3 least one test pad can be accessed and electrically connected on opposing sides of
4 said test pad, and wherein said step of bonding said interconnect assembly to said
5 prepared integrated circuit chip flip bonds said solder layer onto one side of said test
6 pad.

1 9. The method of claim 1 where said step of passivating said bonded
2 interconnect assembly and said prepared integrated circuit chip into an integral
3 structure to provide said electronic package comprises underfilling said prepared
4 integrated circuit chip with an insulating material to remove all voids between said
5 prepared integrated circuit chip and said interconnect assembly.

1 10. The method of claim 1 where said step of passivating said bonded
2 interconnect assembly and said prepared integrated circuit chip into an integral
3 structure to provide said electronic package comprises potting said interconnect
4 assembly and said prepared integrated circuit chip into an integral package.

1 11. The method of claim 9 where said step of passivating said bonded
2 interconnect assembly and said prepared integrated circuit chip into an integral
3 structure to provide said electronic package comprises potting said interconnect
4 assembly and said prepared integrated circuit chip into an integral package.

1 12. The method of claim 10 further comprising the step thinning said prepared
2 integrated circuit chip.

1 13. The method of claim 10 further comprising the step of accessing said
2 prepared integrated circuit chip through electrical connection to said at least one test
3 pad through a surface thereof opposing said surface of said test pad contacting a

4 terminal of said prepared integrated circuit chip to test said prepared integrated circuit
5 chip.

1 14. The method of claim 10 wherein a plurality of interconnect assembly and
2 prepared integrated circuit chips are bonded together to form a corresponding plurality
3 of electronic packages and further comprising the step of releasing said plurality of
4 electronic packages from each other.

1 15. The method of claim 1 wherein a plurality of interconnect assembly and
2 prepared integrated circuit chips are bonded together to form a corresponding plurality
3 of electronic packages and further comprising the step of testing said interconnect
4 assembly and bonding a tested interconnect assembly in said step of bonding said
5 interconnect assembly to said prepared integrated circuit chip only if said interconnect
6 assembly tested good.

1 16. The method of claim 15 where said step of forming said plurality of
2 interconnect assemblies comprises forming said interconnect assemblies
3 simultaneously in a wafer and where said plurality of prepared integrated circuit chips
4 are individually bump bonded to successfully tested ones of said interconnect
5 assemblies.

1

1 ~~17. An electronic package comprising:~~
2 ~~a pre-formed integrated circuit chip;~~
3 ~~an interconnect assembly separately from said pre-formed integrated circuit chip;~~
4 ~~a plurality of conductive bumps connected to the terminals of the integrated~~
5 ~~circuit chip, said interconnect assembly bonded to said prepared integrated circuit chip;~~
6 ~~and~~
7 ~~a passivating layer disposed about said interconnect assembly and said~~
8 ~~prepared integrated circuit chip after said interconnect assembly and said prepared~~
9 ~~integrated circuit chip have been bonded together thereby forming into an integral~~
10 ~~structure.~~

1 ~~18. The electronic package of claim 17 wherein said interconnect assembly~~
2 ~~comprises is formed on a releasable substrate.~~

1 ~~19. The electronic package of claim 1 wherein said interconnect assembly~~
2 ~~comprises at least one test pad in an interconnect layer, which at least one test pad can~~
3 ~~be accessed and electrically connected on opposing sides of said test pad.~~

1 ~~20. The electronic package of claim 19 wherein said at least one test pad~~
2 ~~forms a test pad has gold on opposing sides of said test pad and sandwiched~~
3 ~~therebetween a conductive field metal.~~

4 ~~21. The electronic package of claim 19 wherein said interconnect assembly~~
5 ~~comprises a plurality of stacked interconnect layers and at least one test pad in said~~
6 ~~plurality of stacked interconnect layers, each of which at least one test pad in each~~
7 ~~interconnect layer can be accessed and electrically connected on opposing sides of~~
8 ~~said test pad.~~

1 ~~22. The electronic package of claim 21 wherein said at least one test pad in~~
2 ~~said plurality of stacked interconnect layers forms at least one test pad in each layer~~
3 ~~having gold on opposing sides of said test pad and sandwiched therebetween a~~
4 ~~conductive field metal.~~

1 ~~23. The electronic package of claim 17 where said plurality of conductive~~
2 ~~bumps are connected to terminals of the integrated circuit chip in order to make a~~
3 ~~connection to said terminals on said integrated circuit chip and further comprising a~~
4 ~~solder layer disposed on said conductive bump.~~

1 ~~24. The electronic package of claim 23 wherein said interconnect assembly~~
2 ~~comprises at least one test pad in said interconnect layer, which at least one test pad~~
3 ~~can be accessed and electrically connected on opposing sides of said test pad, and~~
4 ~~wherein said interconnect assembly is bonded to said prepared integrated circuit chip~~
5 ~~by a flip bond to said solder layer onto one side of said test pad.~~

1 25. ~~The electronic package of claim 17 where said passivating layer combines~~
2 ~~said interconnect assembly and said prepared integrated circuit chip into an integral~~
3 ~~structure and includes insulating material underfilling of said prepared integrated circuit~~
4 ~~chip to remove all voids between said prepared integrated circuit chip and said~~
5 ~~interconnect assembly.~~

1 26. ~~The electronic package of claim 17 where said passivating layer combines~~
2 ~~said interconnect assembly and said prepared integrated circuit chip into an integral~~
3 ~~structure and is comprised of a potting material.~~

1 27. ~~The electronic package of claim 25 where said passivating layer combines~~
2 ~~said interconnect assembly and said prepared integrated circuit chip into an integral~~
3 ~~structure and is comprised of a potting material.~~

1 28. ~~The electronic package of claim 26 where said prepared integrated circuit~~
2 ~~chip is thinned after being potted.~~

1 29. ~~The electronic package of claim 27 said prepared integrated circuit chip is~~
2 ~~accessed through electrical connection to said at least one test pad through a surface~~
3 ~~thereof opposing said surface of said test pad contacting a terminal of said prepared~~
4 ~~integrated circuit chip to test said prepared integrated circuit chip.~~

1 ~~30. The electronic package of claim 27 wherein a plurality of interconnect~~
2 ~~assembly and prepared integrated circuit chips are bonded together to form a~~
3 ~~corresponding plurality of electronic packages which are later released from each other.~~

1 ~~31. The electronic package of claim 17 wherein a plurality of interconnect~~
2 ~~assembly and prepared integrated circuit chips are bonded together to form a~~
3 ~~corresponding plurality of electronic packages in which said interconnect assemblies~~
4 ~~are tested and a tested interconnect assembly is bonded to said prepared integrated~~
5 ~~circuit chip only if said interconnect assembly tested good.~~

1 ~~32. The electronic package of claim 31 where in said plurality of~~
2 ~~interconnect assemblies said interconnect assemblies are formed simultaneously~~
3 ~~in a wafer and where said plurality of prepared integrated circuit chips are~~
4 ~~individually bumped bonded to successfully tested ones of said interconnect~~
5 ~~assemblies.~~